Innovation and Disruption In Urban Mobility

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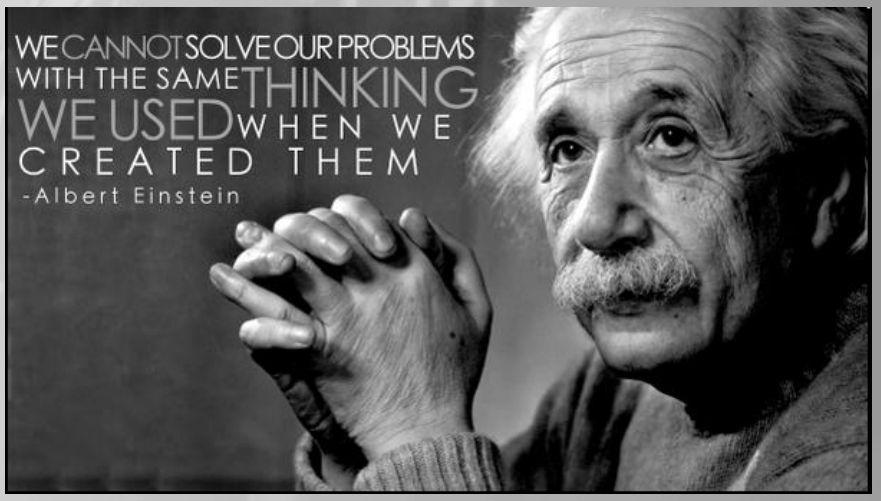
Overview

- Sharing economy
- Changing perceptions
- Historical overview of shared mobility
- Shared mobility: market trends, impacts, and highlights
- Future
- Summary



The trend is clear:
Access trumps possession.
Access is better than **ownership**
- Kevin Kelly

Shaheen, 2015

Not New

Lots of Coverage

Lots of Confusion

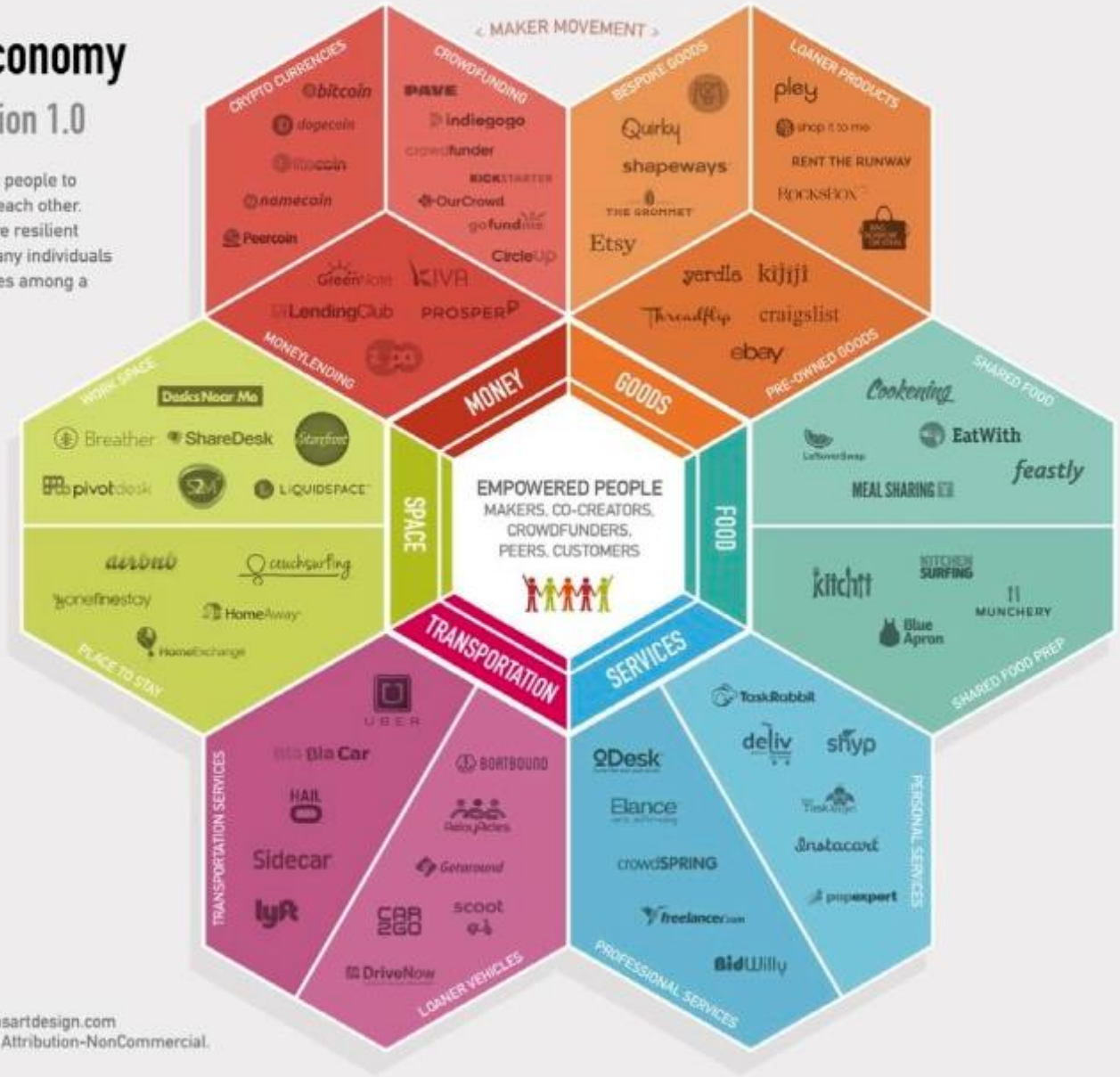
The Sharing Economy

Collaborative Economy Honeycomb Version 1.0

The Collaborative Economy enables people to efficiently get what they need from each other. Similarly, in nature, honeycombs are resilient structures that efficiently enable many individuals to access, share, and grow resources among a common group.

In this visual representation, this economy is organized into discrete families, sub-classes, and example companies. To access the full directory of 9000+ companies visit the Mesh Index, at meshing.it/companies managed by Mesh Labs.

By Jeremiah Owyang
@Jowyang



KEY MARKET FORCES

SOCIETAL DRIVERS
- DESIRE TO CONNECT
- SUSTAINABLE MINDSET
- POPULATION INCREASE

ECONOMIC DRIVERS
- FINANCIAL CLIMATE
- UNTAPPED IDLE RESOURC
- STARTUPS HEAVILY FUNDE

TECHNOLOGY ENABLER
- INTERNET OF EVERYTHING
- MOBILE TECHNOLOGIES
- SOCIAL NETWORKS

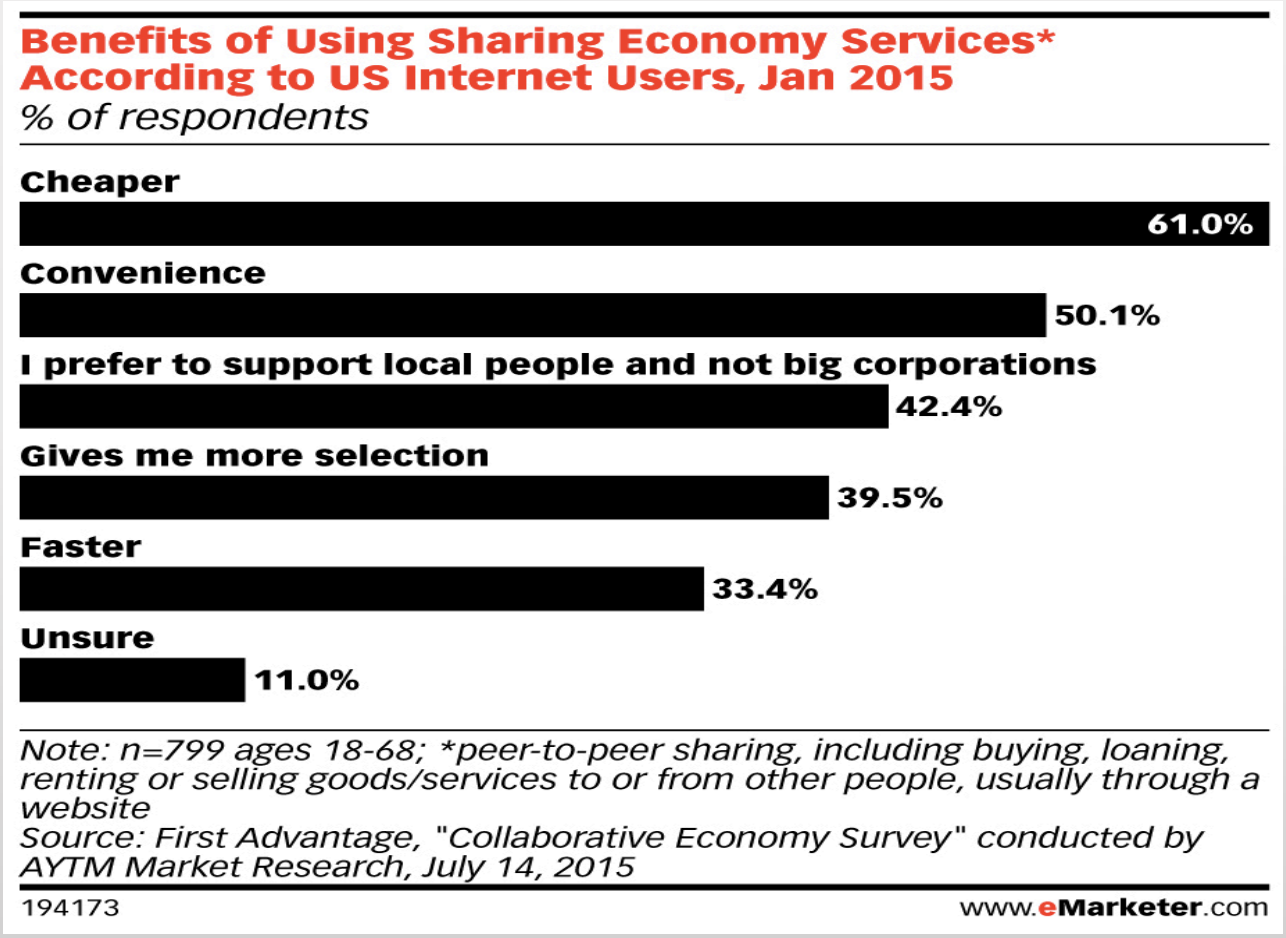
With input from:
Neal Gorenflo (@gorenlo),
Lisa Gansky (@instigating),
Shervin Pishevar (@sherpa),
Mike Walsh (@mwalsh),
Brian Solis (@briansolis),
Alexandra Samuel (@awsamuel),
and Vision Critical (@visioncritical).

Design by Vladimir Mirkovic www.transartdesign.com
May 2014.

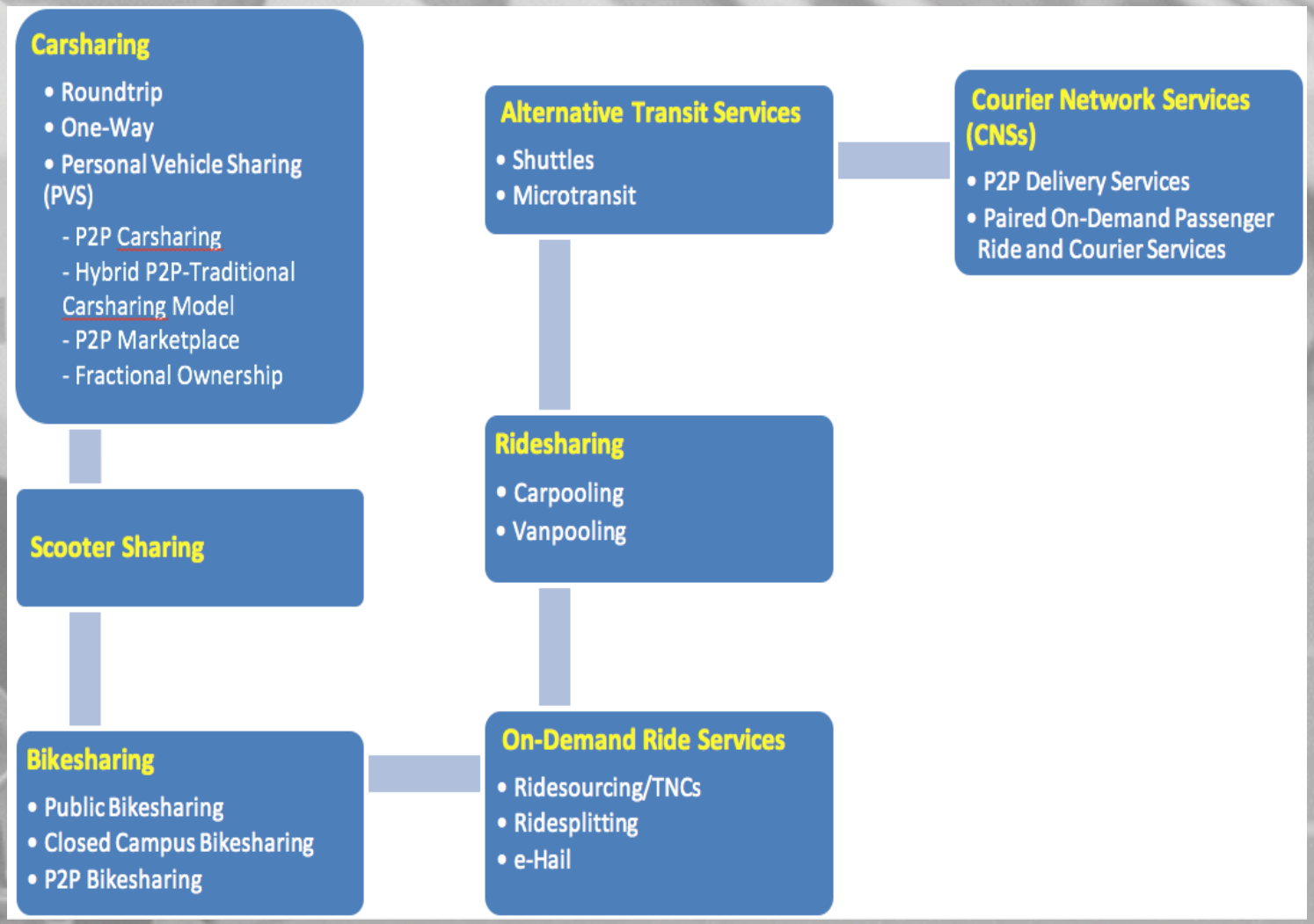
CROWD COMPANIES
www.crowdcompanies.com

Sharing Economy: Some Stats

Benefits of Sharing Economy Services



Shared Mobility Ecosystem



Shaheen et al., 2015

Changing Perceptions

- Focus on sustainability + smart cities growing
- Shared mobility + TDM changing perceptions of mobility in US and worldwide
    - The Sharing Economy
    - "Access trumps ownership"
- Shared mobility spawning innovative business models + influencing individual transportation choices and behavior
- Ongoing evolution + changes expected

Shaheen, 2015

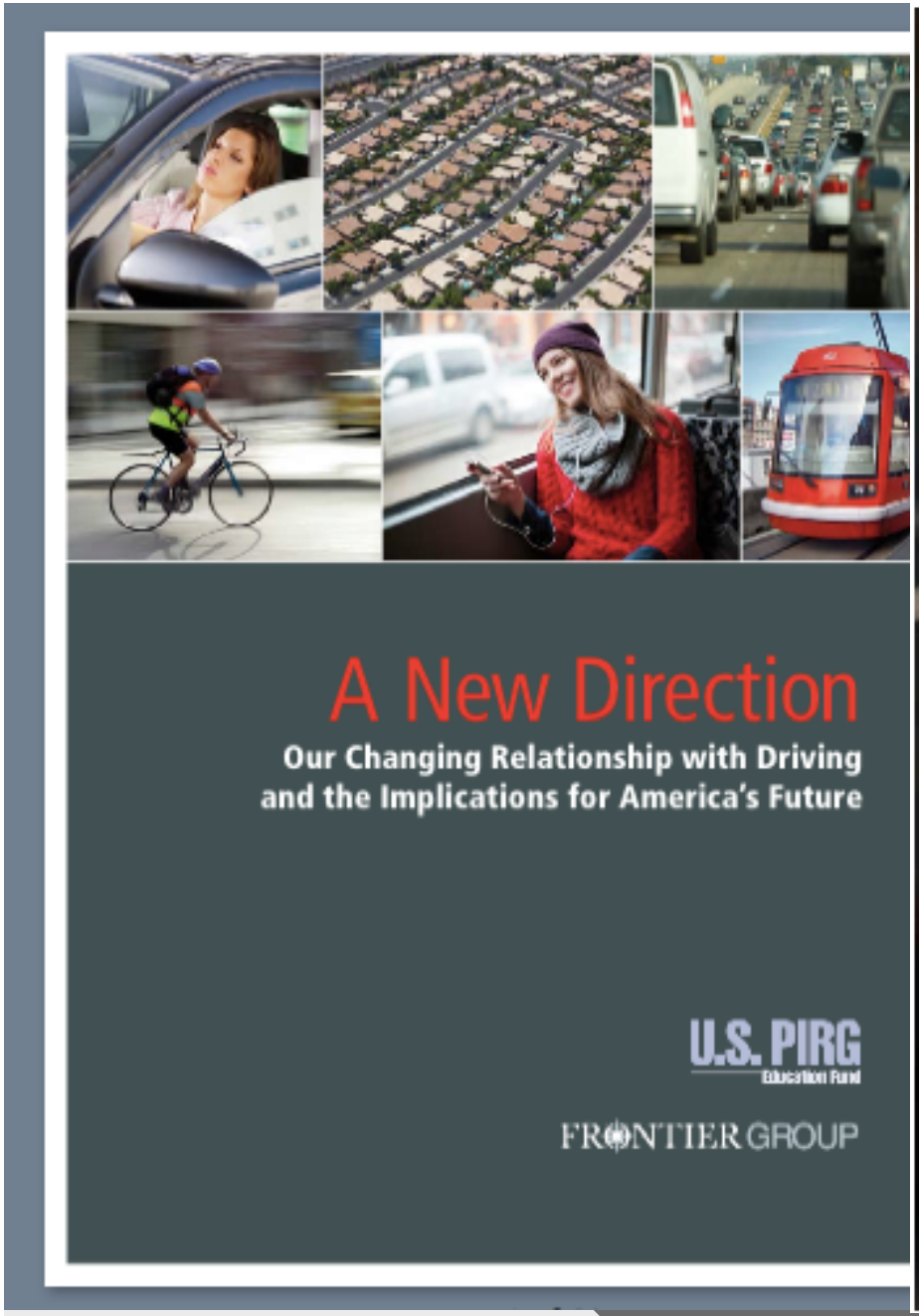
TCRP J-11 Study

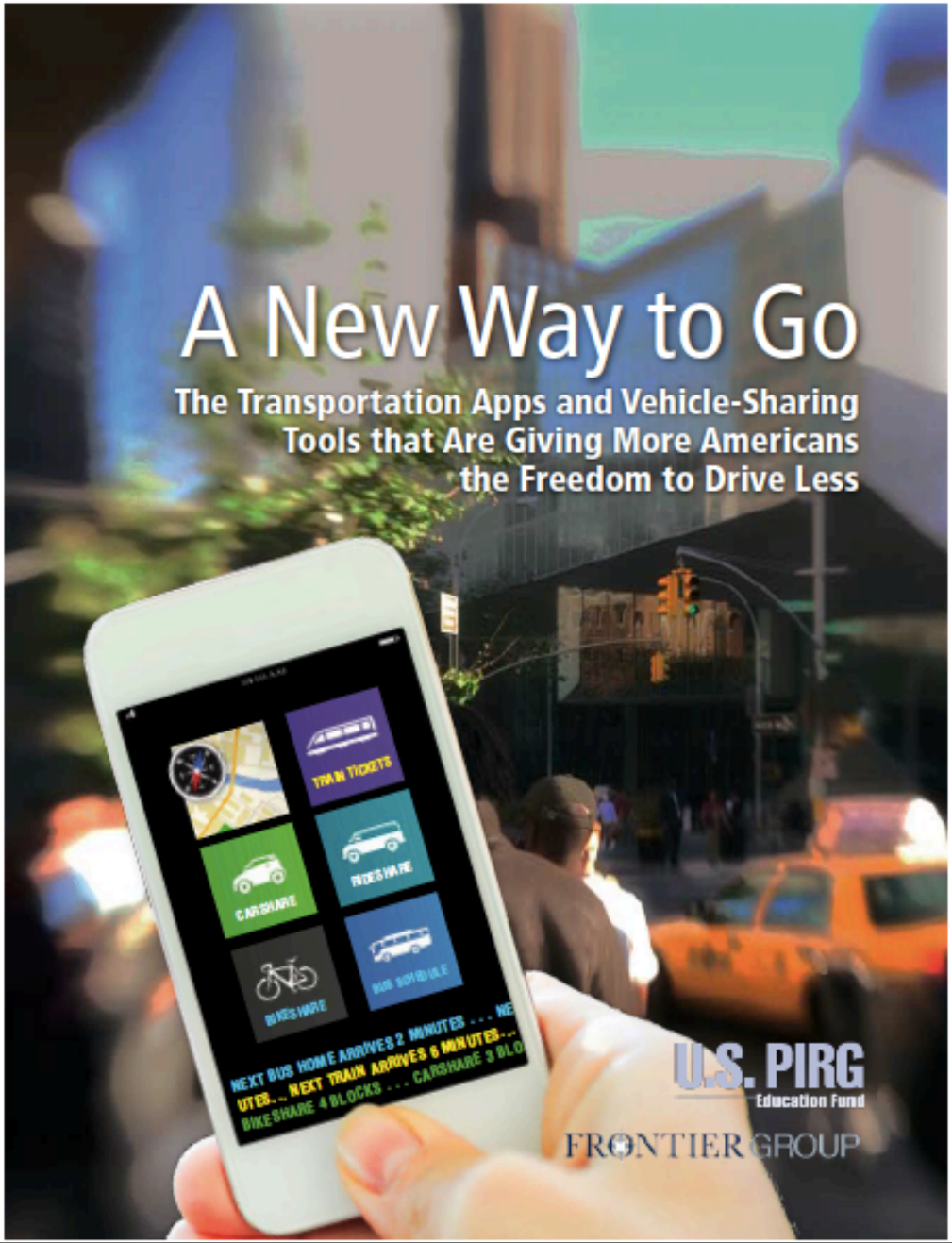
Understanding Millennials Living in Urban Areas

TCRP Report: Millennials & Mobility

Key Findings:

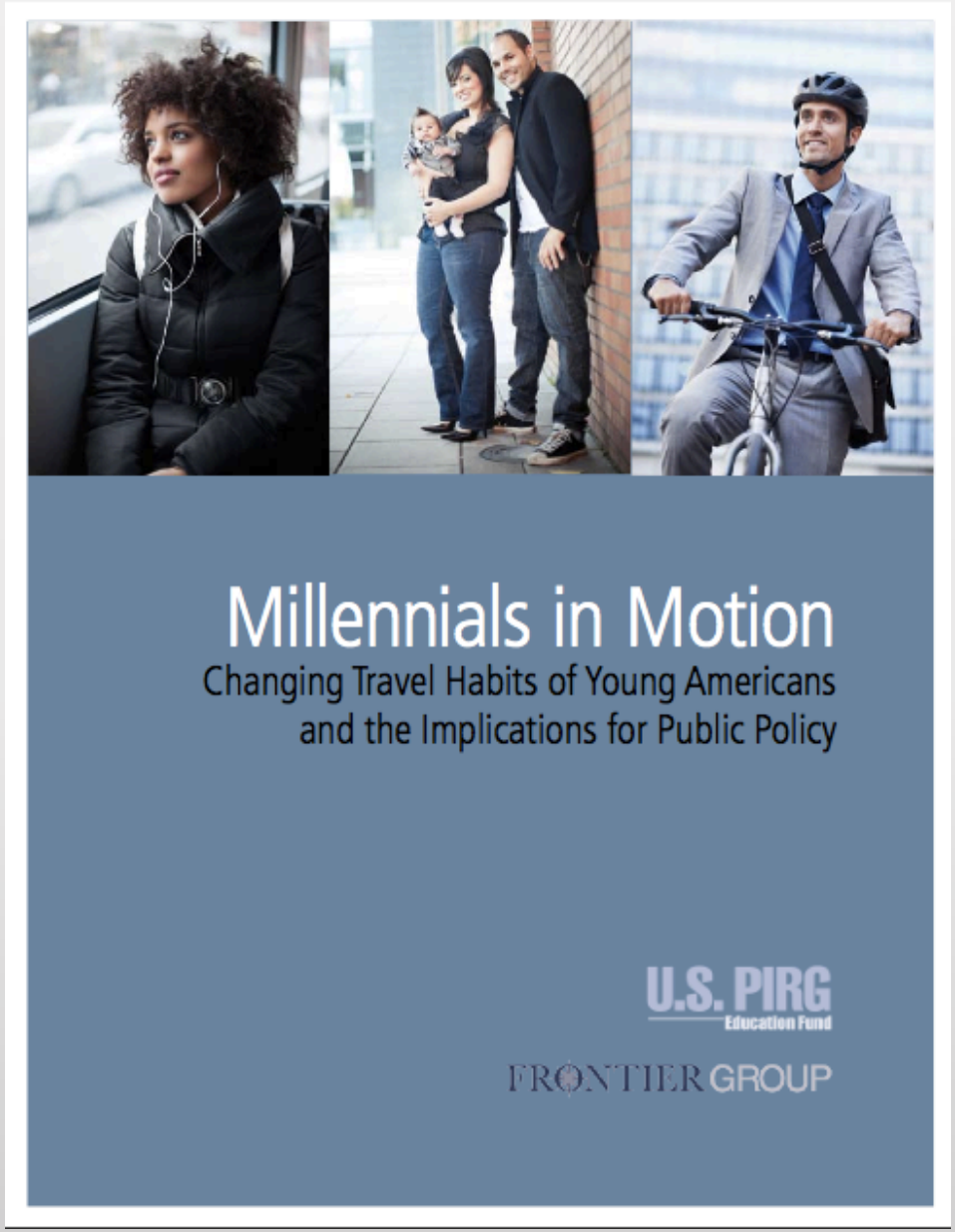
- Cost, convenience + exercise top motivators
- Multi-modality driven by cost, convenience, and time savings
- Attracted to mobile + digital services that provide detailed, real-time and multi-modal trip-planning information
- Decision to drive largely about avoiding hassles — e.g., finding parking, avoiding tolls, etc.
- Constant Internet connectivity and ability to multitask while commuting key
- Environmental considerations are a plus but not a core motivator





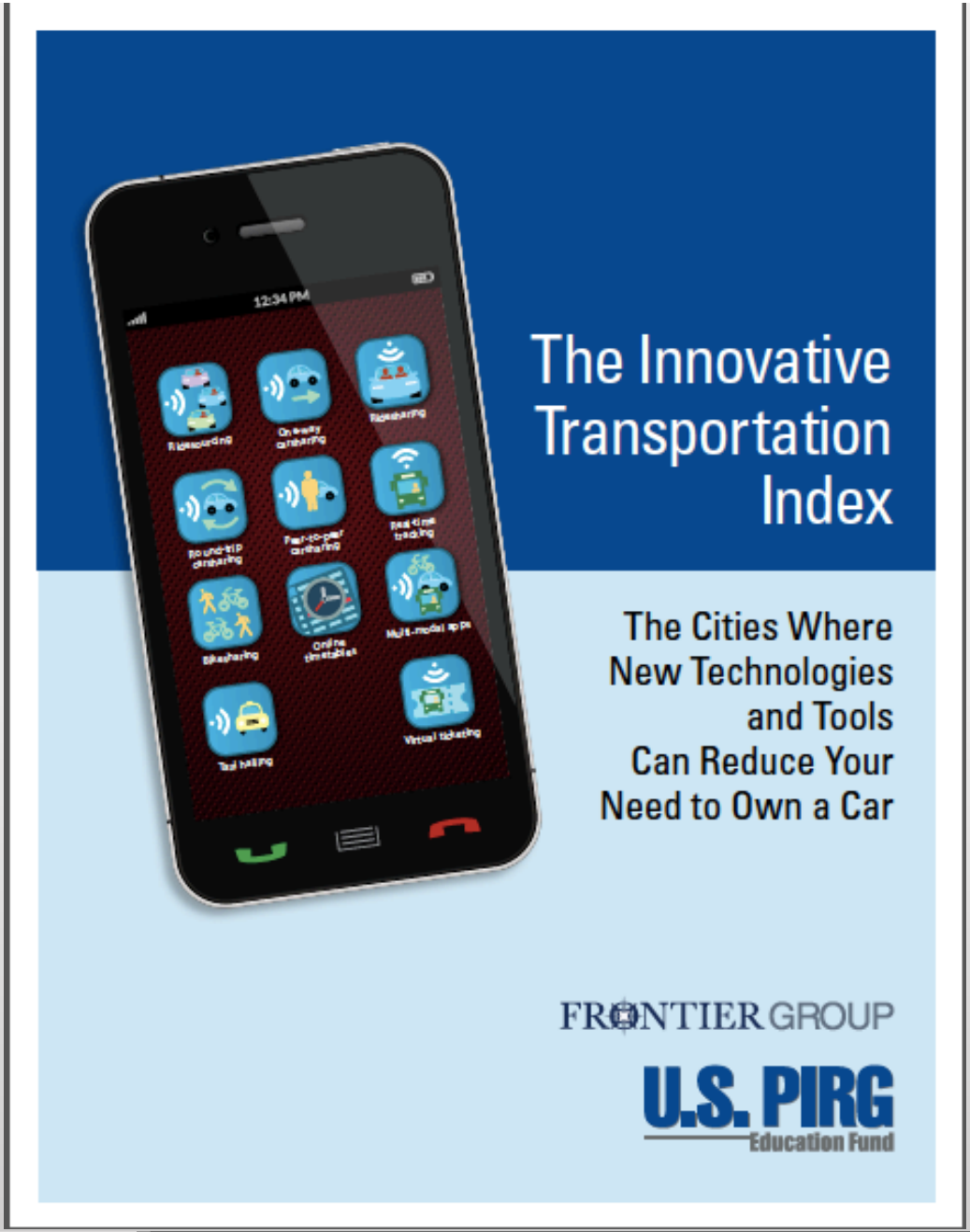
Recent U.S. Studies

Changes in Driving & Role of Apps, Sharing



Oct. 2014 Study

Millennials Shifting Away from Driving

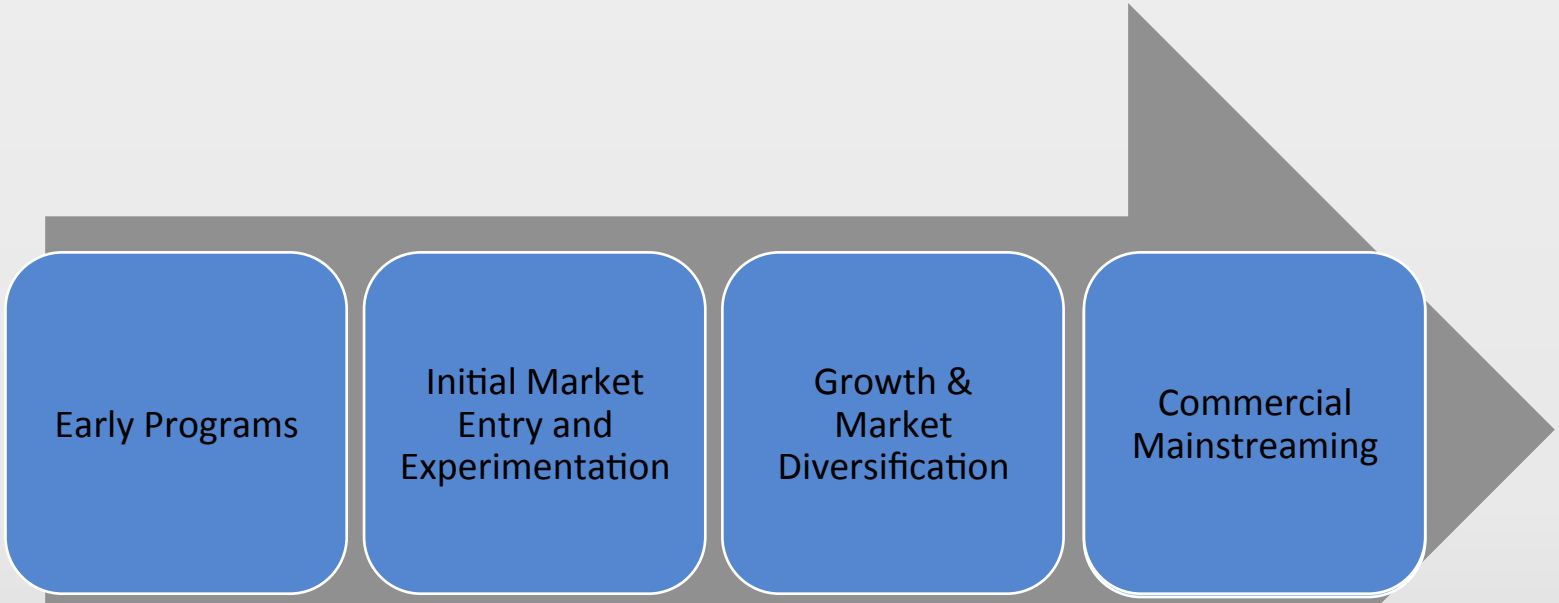


Feb. 2015 Study

Innovative Transportation Index

The Past

Phases of Carsharing Evolution



Shaheen and Cohen, 2015

Phases of Bikesharing Evolution

1st Generation
Free Bikes

2nd Generation
Coin Access

3rd Generation
IT-based

4th Generation
Demand-Responsive/
Multi-Modal

Shaheen et al, 2011

Phases of Ridesharing Evolution

World War II car-sharing clubs

Major responses to energy crises

Early organized ridesharing schemes

Reliable ridesharing schemes

Technology-enabled ridematching

Chan and Shaheen, 2011

The Present

Carsharing Service Models

Roundtrip Carsharing:
Round trip, pay by the hour/mile, non-profit and for profit fleet models

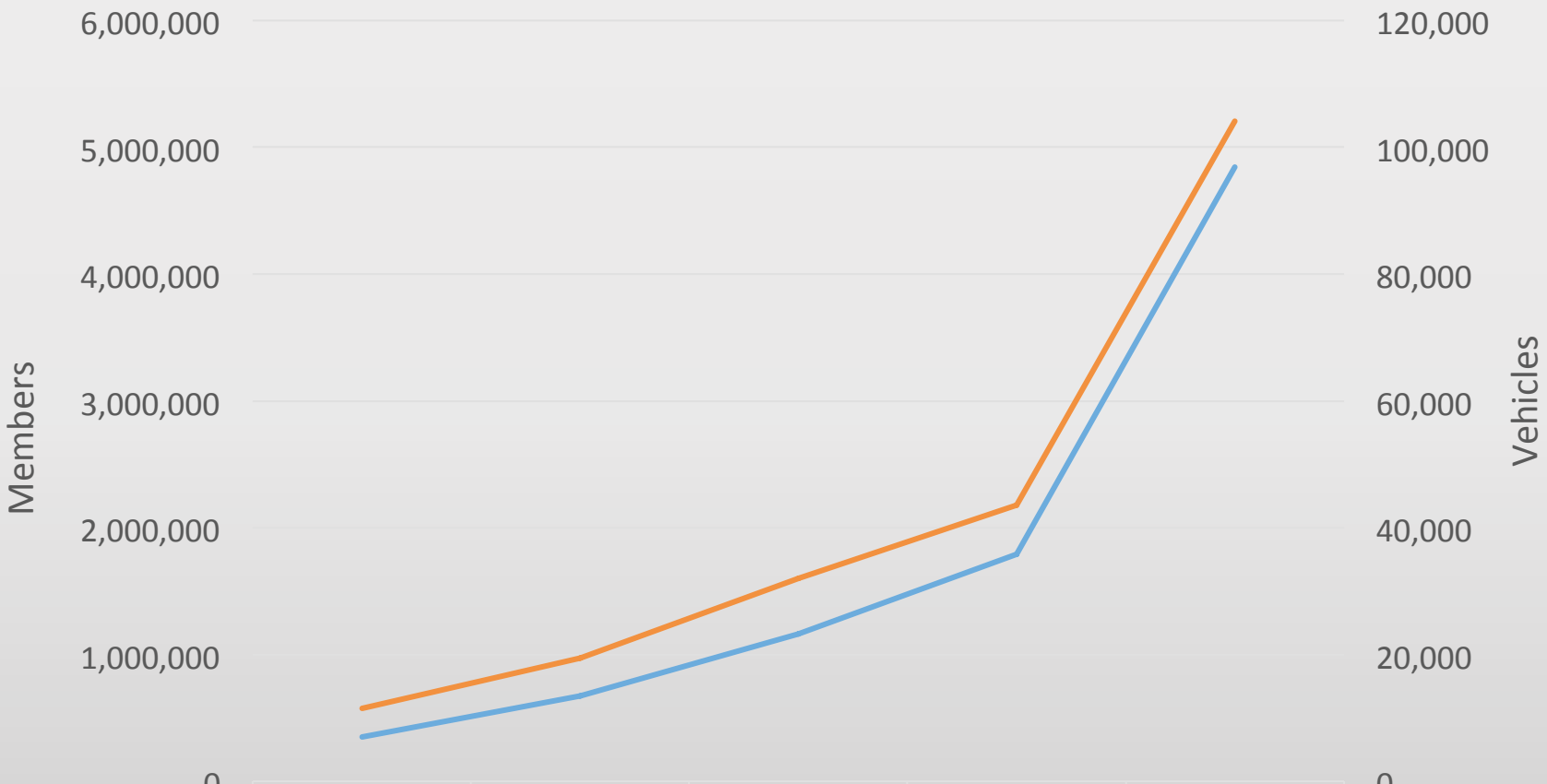
Peer-to-Peer Carsharing:
Shared use of private vehicle typically managed by third party

One-Way Carsharing:
Pay by the minute, point to point, fleet operated, street parking agreements

Fractional Ownership Carsharing:
Individuals sublease or subscribe to a vehicle owned by a third party

Shaheen, 2015

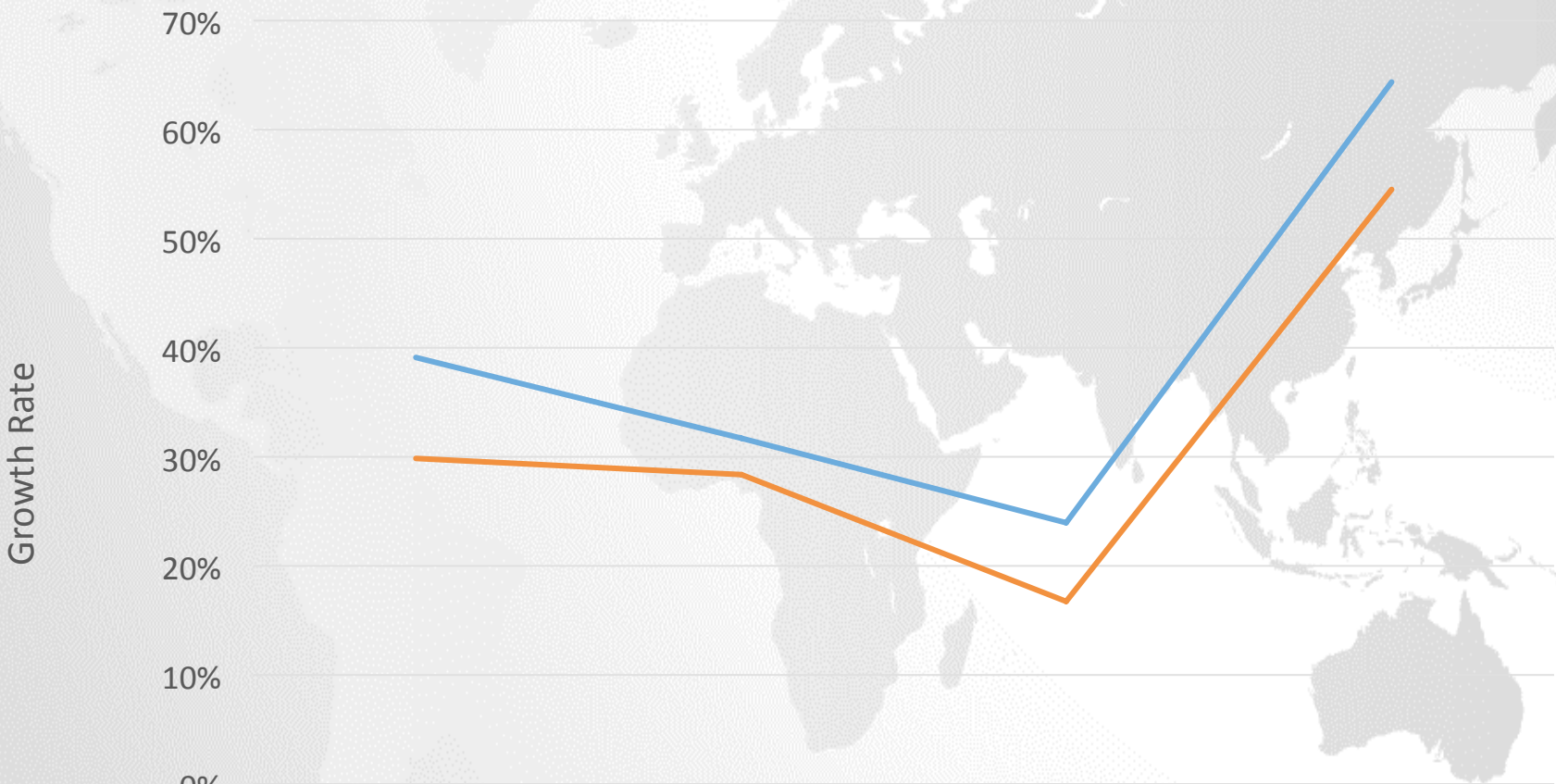
Growth of Worldwide Carsharing



	2006	2008	2010	2012	2014
Members	346,610	670,822	1,163,405	1,788,027	4,842,616
Vehicles	11,501	19,403	31,967	43,554	104,125

Shaheen and Cohen, 2015

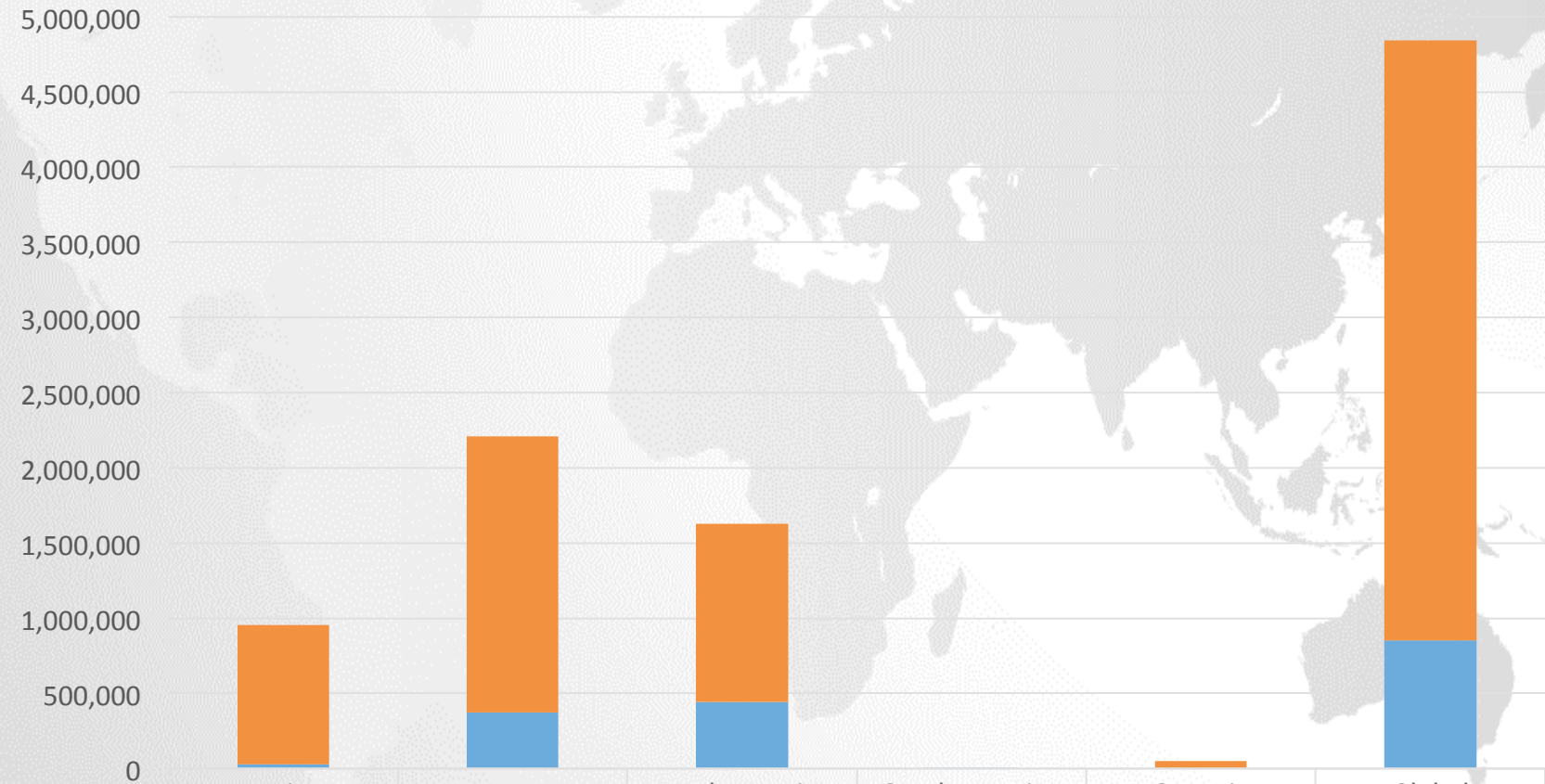
World Carsharing Growth Rates



	2006-08	2008-10	2010-12	2012-14
Members	39%	32%	24%	64%
Vehicles	30%	28%	17%	55%

Shaheen and Cohen, 2015

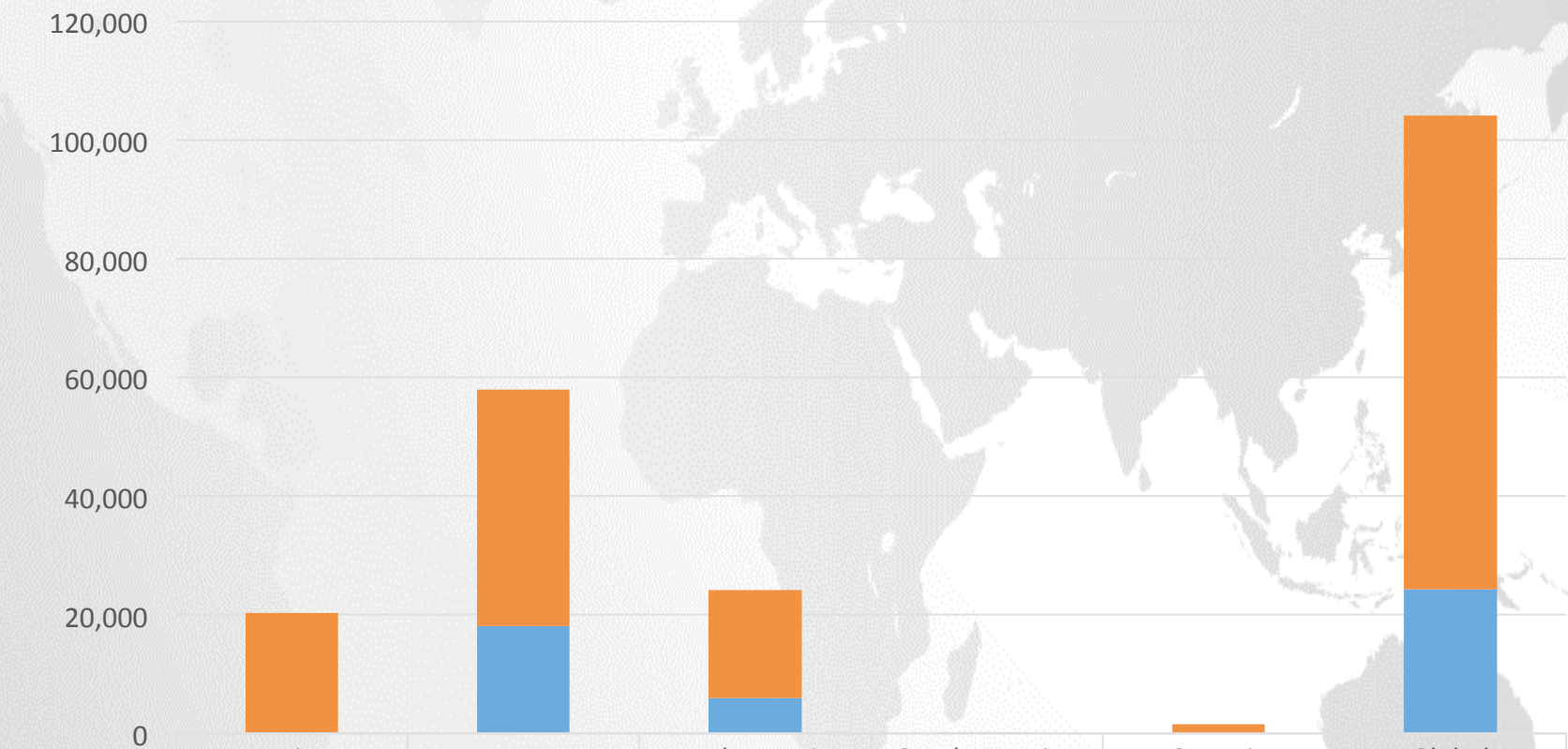
2014 Membership: One-Way & Roundtrip



	Asia	Europe	North America	South America	Oceania	Global
Round-trip	926,280	1,834,418	1,179,930	0	50,000	3,990,628
One-way	29,600	372,466	445,722	3,500	700	851,988

Shaheen and Cohen, 2015

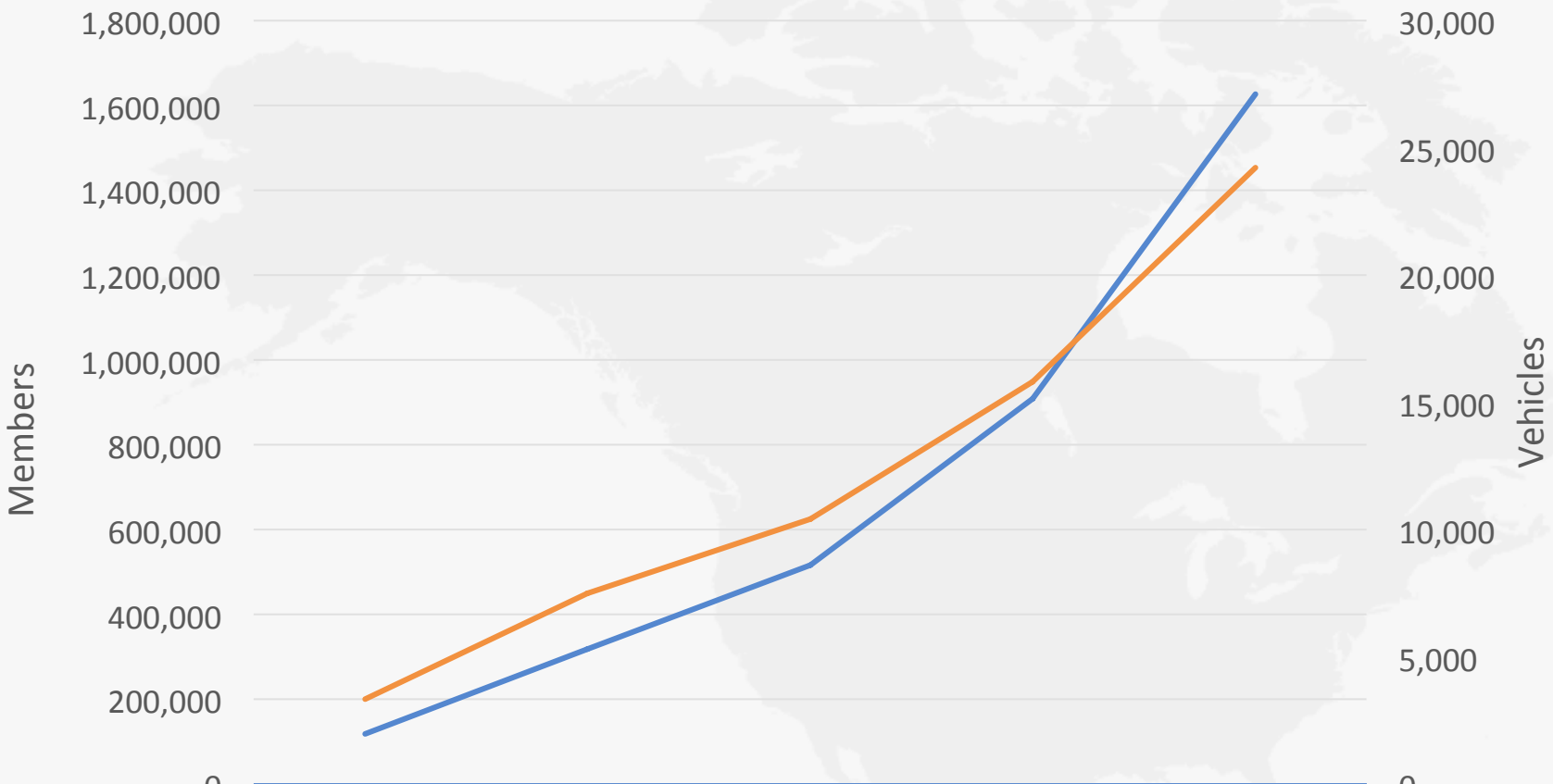
2014 Vehicles: One-Way & Roundtrip



	Asia	Europe	North America	South America	Oceania	Global
Round-trip	20,199	39,904	18,267	0	1,500	79,859
One-way	145	18,043	5,943	100	24	24,266

Shaheen and Cohen, 2015

North American Longitudinal Trends



	2006	2008	2010	2012	2014
Members	117,656	318,898	516,100	908,584	1,625,652
Vehicles	3,337	7,505	10,420	15,795	24,210

Shaheen and Cohen, 2015

2008 North American Carsharing Survey: Key Findings

- Between **9 to 13 vehicles removed**, including postponed purchase
- **4 to 6 vehicles**/carsharing vehicle **sold** due to carsharing
- 25% sell a vehicle; 25% postpone purchases
- **27 - 43% VMT/VKT** reduction per year, considering vehicles sold and purchases postponed
- More users increased **overall** public transit and non-motorized modal use (including bus, rail, walking, and carpooling) than decreased it

Martin et al. 2010

2008 North American Carsharing Survey: Key Findings

- Reduction of **0.58-0.84 metric tons** of **GHG** emissions per year for one household (mean observed and full impact)
- 34% - 41% reduction of **GHG** emissions per year for one household.
- $154 - $435 monthly household savings per U.S. member after joining carsharing

Martin et al. 2010

Carsharing Highlights: 2015

- CarSharing Association Conference in Vancouver, BC
  – September 22-23
  http://conference.carsharing.org/
- Disrupting Mobility Summit in Cambridge, MA
  – November 11-13
  http://www.disrupting-mobility.org/#welcome-
- Fractional ownership through Audi "Unite"
- E-bikesharing and carsharing to launch in SF Bay Area
- New entrants and the growth of one-way and electric service models

Bikesharing Service Models

Public Bikesharing:
Point to point, pay by the ½ hr, fleet operated, docking stations

Closed Community Bikesharing:
Campuses and closed membership, mainly roundtrip, linking to carsharing

Peer-to-Peer Bikesharing:
Rent or borrow hourly or daily from individuals or bike rental shops

Shaheen, 2015

Worldwide and U.S. Bikesharing: May 2015

Worldwide: **880 cities** with IT-based operating systems

- **1,036,000 bikes**

  ~811,500 bikes in China (and 256 cities)

U.S.: **72 cities** with IT-based systems (52 programs)

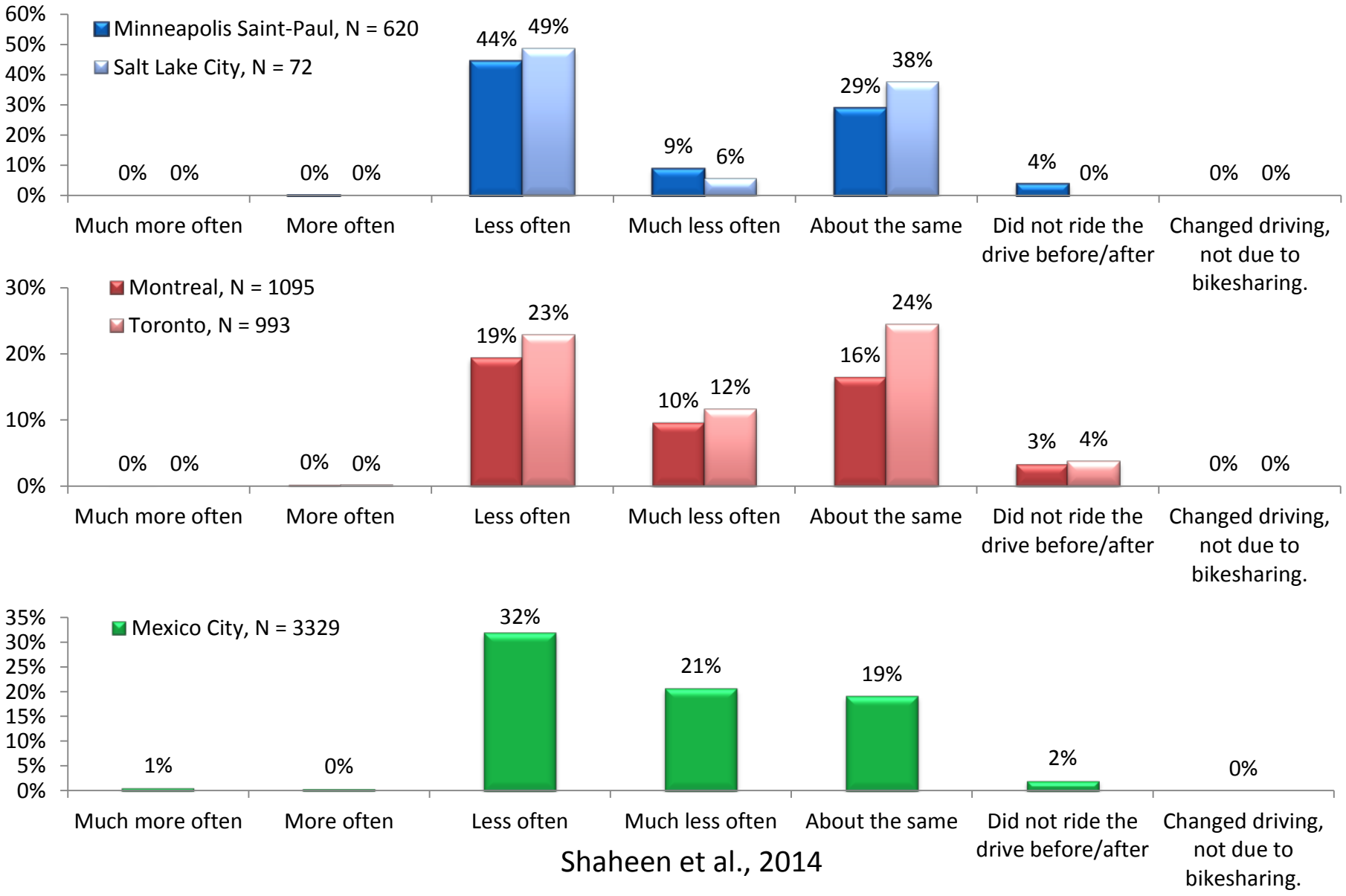
- **~24,700 bikes**
- **2,440 stations**

In 2015, 21 new programs to begin operating in world: 13 are in China and 8 in US

Source: Russell Meddin, 2015

Change in Driving

As a result of my use of bikesharing, I drive a personal vehicle (e.g., car, SUV, etc.) …



Shaheen et al., 2014

Bikesharing Impacts

- Bikesharing members in larger cities ride bus less, attributable to reduced costs + faster travel associated with bikesharing

- Rail usage increases in small cities (Minneapolis-St. Paul) and decreases in larger cities (Mexico City, Montreal, and Washington D.C.) with denser rail networks
  - Shifts away from public transit in urban areas are often attributed to faster travel times + cost savings from bikesharing use

Shaheen et al. 2014

Bikesharing Highlights: 2015

- Recent launch of North American Bikeshare Association (NABSA)
- Campus-based systems (Zagster, SoBi)
- Free-floating bikesharing (SoBi)
- p2p Bikesharing (Spinlister)
- E-bikesharing + carsharing
- Keyless bike locks (BitLock)

Shaheen, 2015

Ridesharing Service Models

Carpooling:
Grouping of travelers into a privately owned vehicle, typically for commuting

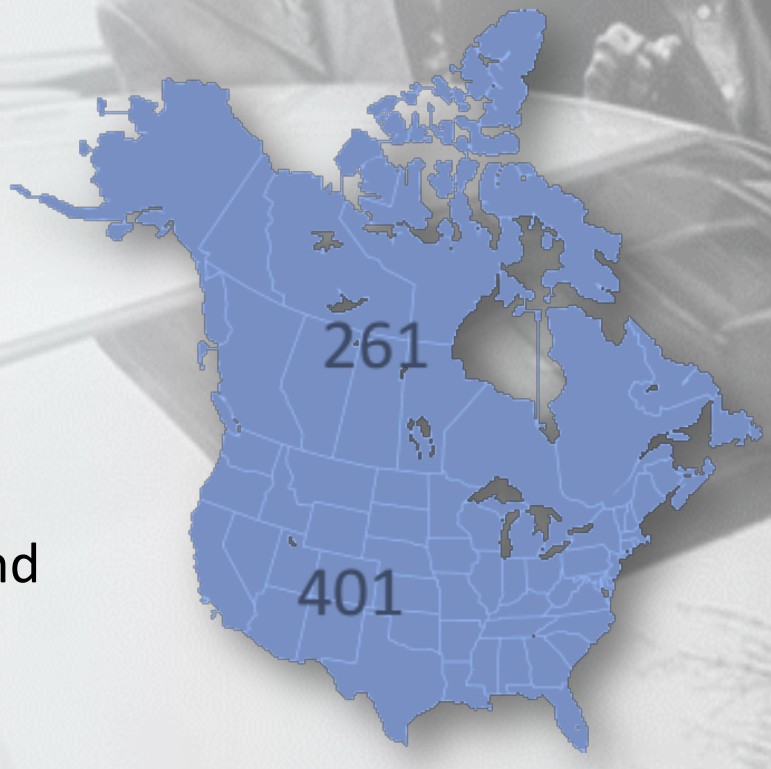
Vanpooling:
Commuters traveling to/from a job center sharing a ride in a van

Real-Time Ridesharing Services:
Match drivers and passengers, based on destination, through app before the trip starts

Shaheen, 2015

Traditional Ridesharing

- Grouping of travelers into common trips by private auto/van (e.g., carpooling and vanpooling)
- Historically, differs from ridesourcing in financial motivation and trip origin/ destination
- 662 ridematching services in the U.S. and Canada (24 span both countries)
  - 612 programs offer carpooling
  - 153 programs offer vanpooling
  - 127 programs offered carpooling and vanpooling



Chan and Shaheen, 2011

Blurring Lines

- Sharing a ride no longer requires prearrangement or street hails
- Mobile technology + social networking facilitate finding a ride in real time (e.g., app-based taxi dispatch or “e-Hail” such as Arro, Curb, Flywheel, and Bandwagon)
- YellowZ – Yellow Cab employing p2p drivers
- Less distinction among classic ridesharing, ridesourcing, and commercial transportation

For-Hire Vehicle Access Models

Ridesourcing/TNCs: Service that allows passengers to connect with and pay drivers who use their personal vehicles for trips facilitated through a mobile application

Street Hail:
Hailed with a raised hand or by standing at a taxi stand or specified loading zone

E-Hail:
Hailed by dispatching a for-hire driver using a smartphone application

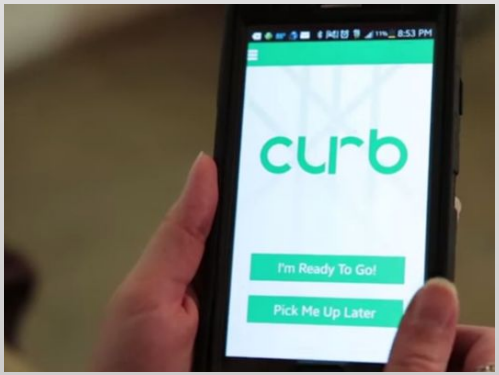
Ridesourcing/TNCs

- Platform used to “source” rides from a driver pool
- App-based, on-demand ride services
- Transportation Network Companies (TNCs)
  - Uber (uberX and uberXL)
  - Lyft
  - Shuddle
  - Sidecar
  - Summon
  - Wingz

Shaheen, 2015

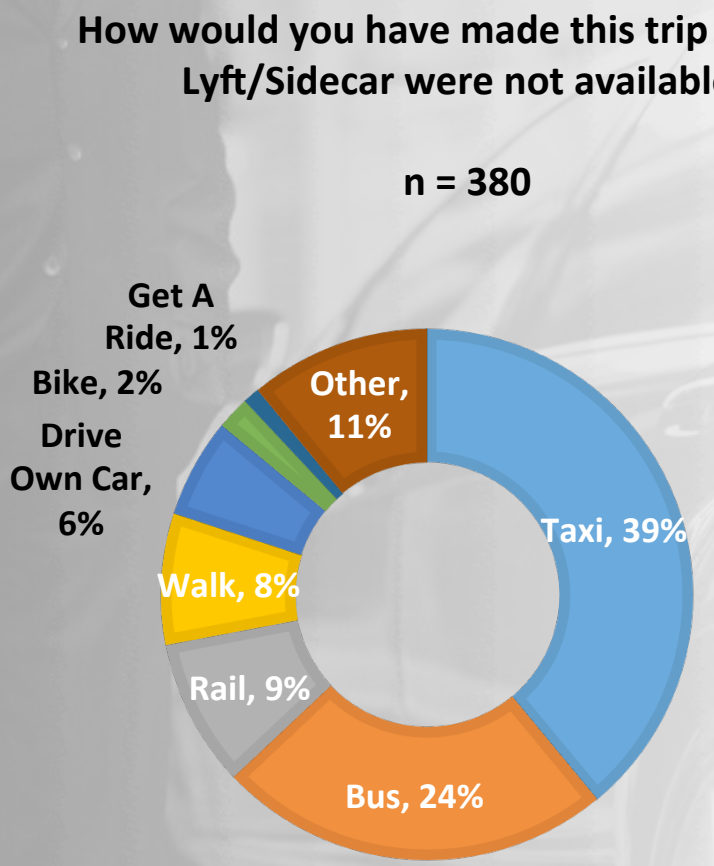
Some Ridesourcing/E-Hail: Market Trends

- Lyft: 60 cities; over 60,000 drivers (2014)
- Uber: 59 countries; 311 cities; over 162,000 drivers in U.S.
- Sidecar: 10 cities; ~10,000 drivers
- Flywheel: 6 cities, over 5,000 drivers
- Curb: 60 cities; 35,000 cabs



Said, 2015; Miller, 2015

Ridesourcing: Some Early Understanding



- 92% would have still made this trip
  - 8% induced travel effect
- 33% would have taken public transit (bus or rail)
- 4% named a transit station origin/destination, suggesting some ridesourcing usage to access public transportation
- 20% avoided driving after drinking

Rayle et al. 2014

Key Findings: Wait Times

About how long did you wait for your ride (from the time you made the request to the time the vehicle arrived)?
Percentages of wait times less than or equal to 10 minutes:

Wait Times	Ridesourcing	Taxi (Phone)	Taxi (Street Hail)
M-F 4am-6pm	93%	35%	39%
M-F (6pm-4am)	92%	16%	33%
S-Su	88%	16%	25%

Rayle et al, 2014

Vehicle Ownership, Occupancy & Driving Frequency

- Ridesourcing and taxis serve residents who don't own a car
  - Ridesourcing survey: 43% no vehicle at home
  - Taxi survey: 35% car-less
- Occupancy: 1.8 TNCs and 1.1 taxis
- Ridesourcing still new, with potential to impact VMT/VKT and vehicle ownership
  - 90% of vehicle owners did not change ownership level
  - 40% drove less since using ridesourcing

Industry Developments: Merging Innovations

- Ride**splitting** within TNCs/ride**sourcing**
  - Lyft Line
  - Sidecar Shared Rides
  - uberPOOL
- **Via** in Manhattan merges aspects of taxi, dynamic routing, and ridesplitting
  - Drivers and vehicles contracted to taxi/limo company
  - Flat-rate fares with set zone and operating hours
  - Shared rides with others going similar direction

Shaheen, 2015

The Future

Shared Mobility Developments

e-Bikesharing

- City Carshare to launch e-bikesharing and carsharing
- Milan's BikeMi traditional bikesharing and e-bikes from same kiosks
- 4,600 bicycles (3,600 pushbikes and 1,000 e-bikes)

Network Courier Services (NCSs) offering p2p deliveries

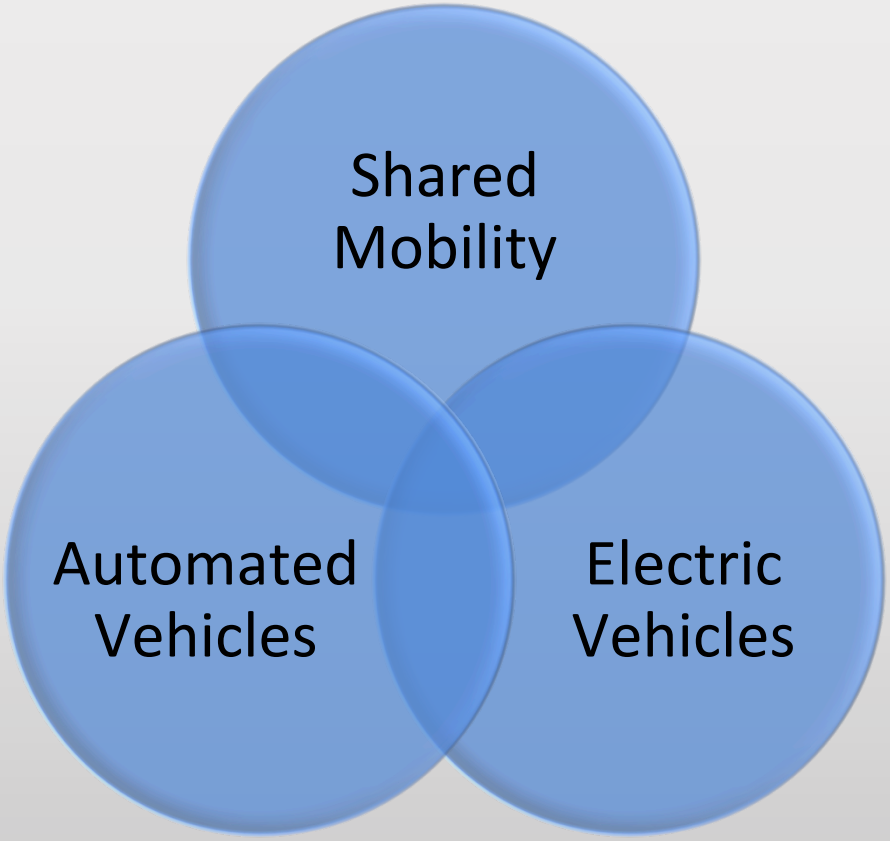
- E.g., Postmates, DoorDash, Shipbird, Sidecar Deliveries
- Launched in 2013, Nimber has 30,000 members and delivers ~10,000 packages a year

Microtransit (e.g., Via, Bridj, Chariot, Leap)

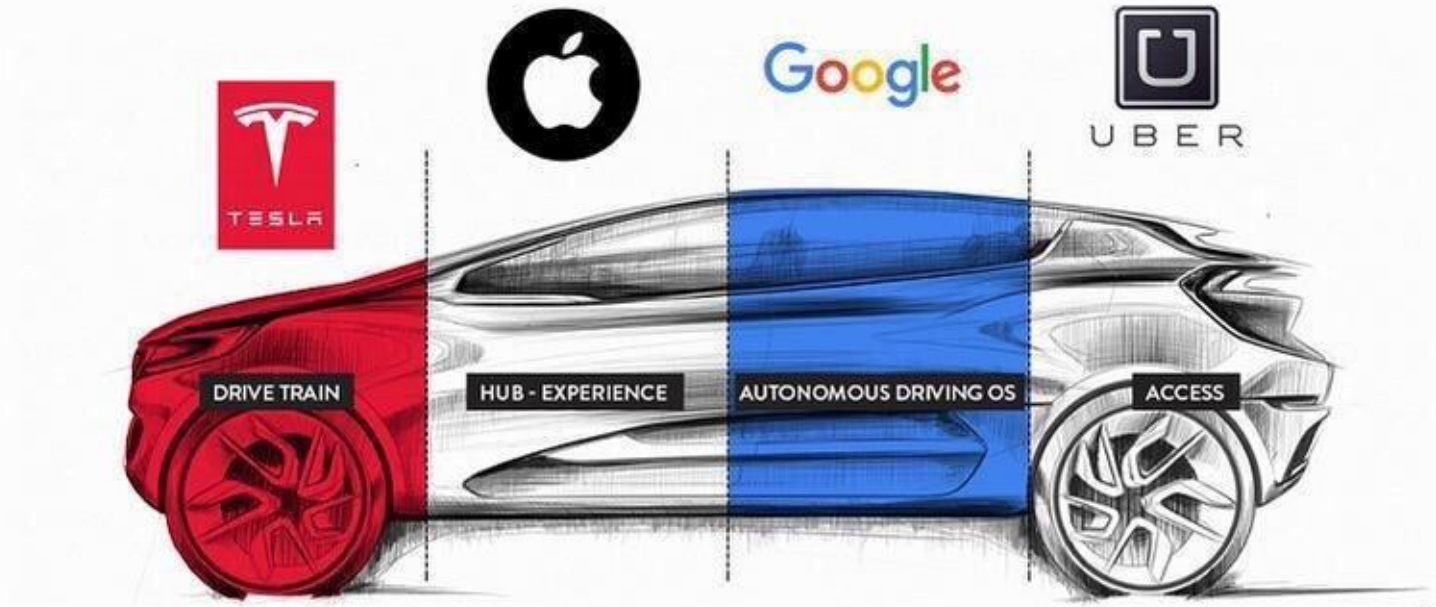
P2P Services focused on college market, airport travelers, and bicycle users

Shaheen, 2015

Future: Confluence of Trends



Shaheen, 2015



VALUE CHAIN DISRUPTION

THIS IS YOUR CAR IN 2020

CAR SKETCH BY PRATHYUSH DEVADAS PRATHYUSHDEVADAS.WORDPRESS.COM

Blurring Lines: More Convergence

Public Transit Services

Ridesourcing/TNCs

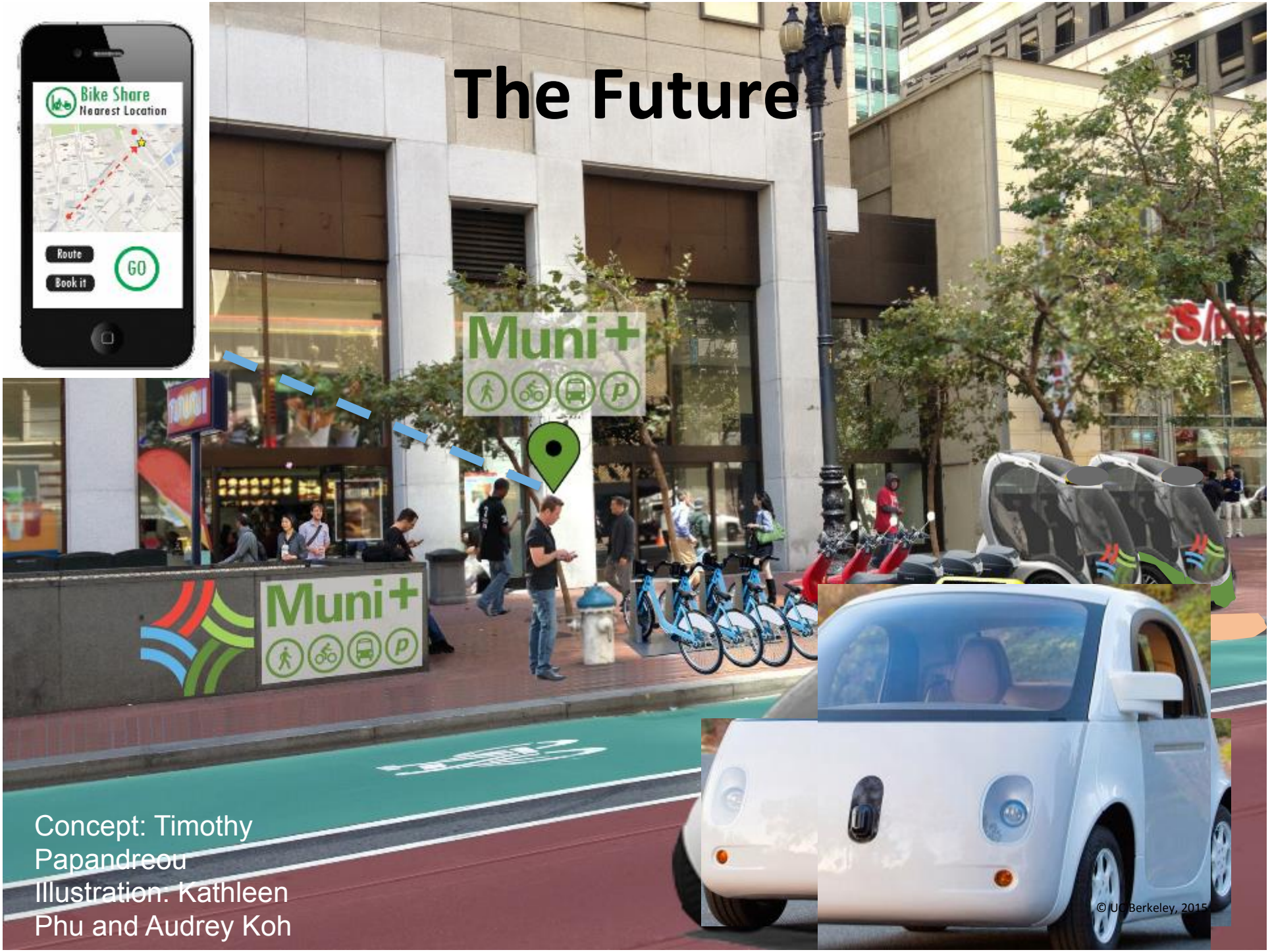
SIMILAR ATTRIBUTES

Michael Galczynski, 2015

Carsharing Services

Car Ownership / P2P Carsharing

The Future



Concept: Timothy Papandreou
Illustration: Kathleen Phu and Audrey Koh

Shared Mobility: Impacts

- Typically reduces car ownership/use and increases walking/cycling
  - e.g., 50% auto reduction in carsharing
- Can complement & compete with public transit
  - Depending on model and location
- Why?
  - Time savings
  - Cost savings
  - Mobility benefits (e.g., health)

Shaheen, 2015

Shared Mobility: Impacts (Cont'd)

- Historically used by:
  - Younger
  - Well educated
  - Upwardly mobile
  - Caucasian individuals
  - Living in urban areas
- How to scale this to other populations & land uses (accessibility, paratransit)?
- More research needed on mobility ecosystem and collective impacts
- Data critical to understanding innovative services

Shaheen, 2015

Summary

- Growing ecosystem of services in mobility + sharing economy
- Long history of shared mobility – dating to as early as 1940s with ridesharing and carsharing
- Over 1.6 M members and 24,210 carsharing vehicles in the US as of October 2014
- Bikesharing: 72 cities in the U.S. 24,700 bikes and 2,440 stations as of May 2015
- Ridesharing: ~662 vanpool/carpool services in U.S. and Canada
- Ridesourcing/TNCs and e-hail growing in the U.S.
- Shared mobility services: more understanding needed

Shaheen, 2015

Disrupting Mobility Summit

A Global Summit Investigating Sustainable Futures, November 11-13, 2015, Cambridge, MA

http://www.disrupting-mobility.org/#welcome-

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